Black holes are the lurky beasts of the Universe. They are like a giant snakes in the jungle - something you do not want to meet unprepared or you will get swallowed. There are three types of the black holes: supermassive, stellar and non-rotating.

Why some black holes rotate and some don`t? Did someone extracted the singularity from the non-rotating ones or they didn`t develop singularity at all? They could have a bundle of matter, in the middle, creating much less gravity force and, maybe, that is why 2014. the G2 cloud of gas passed near the Sagittarius A mostly intact instead of being sucked in. Also, non-rotating black holes lack strong magnetic field. Is the singularity black hole`s power plant without which its host stops spinning and viciously pulling? Is there a civilization in our galaxy that has already achieved second, or even third, degree on the Cardashev scale exploiting black holes as the sources of an enormous energy due to the singularity phenomenon they possess? There are many unanswered questions.

Let us start with the basic facts:

Black hole is the region of the Cosmos (spacetime) where (anti)matter is concentrated in the infinitesimal dot called "the singularity" violating the known physical laws in such manner that they practically seize to exist. Black hole`s gravity force is tremendous: not even massless light particle, photon, can escape its strong pull. They even drag and stretch (tear?) the surrounding fabric of the spacetime.

Spinning black holes must have the axis of their rotation. I assume that periodical two-sided outbursts of the energy, named "jets of radiation", occur exactly along them. The trigger could be a critical power accumulation inside the singularity which must be released due to the unsustainable pressure exerted on the core. Each black hole has a limit depending on its respective size (mass).

There are two most important principles concerning the black holes: 1) Tolman-Oppenheimer-Volkoff limit: 2.2 to 2.9 solar masses and 2) Schwarzschild radius: rs = 2GM / c2.

Star must be in the range of the TOV limit, or heavier, to fall down, collapse into a black hole after its fuel has been exhausted.

Schwarzschild radius determines the border of the black hole`s event horizon. It is only valid for the non-rotating, spherically symmetric body. Spinning black holes are slightly distorted, a bit stretched along the axis. They require adjustion of the Schwarzschild radius or incorporation of the angular momentum and the amount of expansion into the formula. Event horizon is the boundary separating the inner area of the black hole, which has significantly stronger gravity, from the outside where the pull force is much weaker. There is probably several layers of the event horizon but when mentioning it we usually refer to the surface layer which is closest to the

exterior of the black hole.

Schwarzschild radius, the solution to the one of the Einstein's field equations, has the mathematical singularity in the part "1 / 1 - rs/r" when r = 0 or when rs = r.

Black holes are extremely cold. Don`t forget to wear a winter clothes if you visit one! Their temperature is near the absolute zero because all the energy and matter is concentrated in the center point (the singularity) which is ultimately dense and hot.

Black holes jets of particles could be the consequence of matter and anti-matter collisions where energy build up inside a singularity is critical and must be released while Hawking radiation serves as an object`s temperature adjustment.

Contemporary estimate say that our galaxy Milky Way alone contain about a hundred (100) million black holes but this are the five (5) most relevant black holes to us:

Cygnus X-1 (first discovered): located some two (2) kiloparsecs from the Earth (about 6.500 light years), it has mass roughly equal to the 21 masses of the Sun. It rotates, creating strong magnetic field and X-ray emissions.

Gaia BH1 (the nearest stellar black hole): located 1500-1600 light-years from the Earth, discovered by the International Gemini Observatory.

Sagittarius A (the nearest supermassive black hole): supermassive black hole located in the center of the Milky Way, in the Sagittarius constellation, approximately 25 thousand light years away from the Earth. It has 4.3 million masses of the Sun and diameter of 23.5 million kilometers.

TON 618 (the heaviest black hole): weights 4 x 10`10 solar masses.

Phoenix A (exceeding the 5 x 10`10 theoretical limit): weights 1 x 10`11 solar masses and with the diameter of 590 billion kilometers it is classified as the stupendously large black hole.

Quantum field theory proposes that event horizons emit Hawking radiation. I don`t find it strange. Remember that the event horizon is the edge of the black hole. Does quantum tunelling play a role in the Hawking radiation?

Black holes were first considered in the 18th century by John Michell and Pierre-Simon Laplace but David Finkelstein first published the term in 1958. The discovery of the neutron stars by Susan Jocelyn Bell Burnell in 1967. ignited the curiosity about the black holes. The first discovered was Cygnus X-1 in 1971.

The special category of the black holes are the primordial black holes, relic behemoths that have more than 100 billion of sollar masses. Phoenix A could easily be one of them.

What if the collapsed stars didn`t burn their fuel but it was removed by the technologically much superior civilization leaving us with the empty basket? Dirty thieves, they took the singularity as well: basket is not only empty but punctured as well!

In the last 50 years three scientists significantly contributed the research of

the black holes: late Sir Stephen William Hawking, Kip Thorne and Sir Roger Penrose who even received Nobel prize in 2020. together with Reinhard Genzel and Andrea Ghez.